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$$\begin{array}{r} \text{Nine days} = 9 \times 24 \times 60 \times 60 = 777600 \text{ seconds} \\ \text{Deduct} \quad 475 \text{ seconds} \end{array}$$

\therefore Time of falling to surface of the earth = 777125 seconds.

The corresponding distance is, $\frac{1}{2}gt^2 = 16\frac{1}{2}(777125)^2 = 9713099188802$ feet
 $= 1839602119$ miles.

Also solved by *H. C. WHITAKER, G. B. M. ZERR, B. F. SINE, J. SCHEFFER, W. H. DRANE,* and *J. B. GREGG.* Mr. Gregg furnished a very elaborate solution, indicating the various steps of the computation, his result being 380738 miles. Dr. Whitaker gets the same result. The results of the various contributors differ widely, due to variously assumed values of the constants, and, in some cases, considering the earth a mere point.

95. Proposed by FLORIAN CAJORI, Ph. D., Author of History of Mathematics, History of Physics, etc., and Professor of Mathematics, Colorado College, Colorado Springs, Col.

Assuming that the velocity is proportionate to the distance described from the state of rest, (1) can the body start in motion? (2) If it can, what is its initial acceleration? If we make the additional assumption that the time of fall, from rest, through a finite distance is finite, does it follow that the distance is infinite?

Solution by WALTER H. DRANE, Graduate Student, Harvard University, Cambridge, Mass.

1. The statement here is somewhat confusing. No body can start in motion unless acted upon by an external force; if it be meant here then to ask, can the body be started, the answer is self-evident. Theoretically, an infinitesimal force would be sufficient to put the body in motion though the time might become infinite before the velocity became finite.

2. We have $ds/dt = ks$ where k is a constant depending upon initial conditions. Differentiating we get $d^2s/dt^2 = k(ds/dt) = k^2s$; that is, the initial acceleration is k times the initial velocity and is itself proportional to the distance. What the value of this initial acceleration is, depends upon the external force acting and the mass of the body.

3. Nothing is said here about the initial force acting. If we assume it infinitesimal, it follows from 1, that if the time of fall through a finite distance is finite, then the velocity must be infinite.

DIOPHANTINE ANALYSIS.

78. Proposed by COOPER D. SCHMITT, A. M., Professor of Mathematics in University of Tennessee, Knoxville, Tenn.

Find three square numbers in harmonical progression.

I. Solution by M. A. GRUBER, A. M., War Department, Washington, D. C.

The terms of an harmonical progression are the reciprocals of such numbers as form an arithmetical progression.

Let a^2 , b^2 , and c^2 be three square numbers in arithmetical progression, $a < b < c$. Then $b^2 - a^2 = c^2 - b^2$, or $a^2 + c^2 = 2b^2$. a , b , and c are rendered rational and integral by putting $a = p^2 - q^2$ the difference between $2pq$, $b = p^2 + q^2$, and $c = p^2 - q^2 + 2pq$.